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# **Strategic Risk Assessment using the Integrated Risk Assessment and Management Model (IRAMM)**

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# Strategic Risk Assessment Framework Background

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- **Strategic risk assessment framework originally developed at IDA in 2005 to assess cross capability tradeoffs**
  - The objective of the risk framework – *co-sponsored by OSD(PA&E), OSD(AT&L), OSD(P), and JS J-8* – was to evaluate the risk to the nation, based on alternative force structures produced by cross-capability trade-offs
  - Interviews conducted May-December 2005 with 27 senior DoD leaders
- **Current effort being conducted in support of DLA Strategic Materials Office**
  - Objective is to build and implement a risk-based process that can help set priorities for risk mitigation concerning strategic and critical non-fuel materials
  - Apply this process to the Secretary of Defense's 2015 National Defense Stockpile Requirements Report to Congress
  - Strategic risk assessment is part of the Risk Assessment and Mitigation Framework for Strategic Materials (RAMF-SM)
  - Today's discussion focuses on non-material related strategic risk identified by senior risk assessment exercise participants

# **Structure of IRAMM**

# Objectives of IRAMM

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- Enhance senior-level decision-making by using the results of one-on-one interviews to help structure and focus senior leader discussions of U.S. strategic risks
  - Quantitatively estimate strategic risks for designated Challenge Areas (CAs) in the context of a specific U.S. force structure
  - Capture qualitative comments that justify quantitative risk scores
- Synthesize quantitative risk estimates and qualitative support (based on the justifications the respondents provide) to help focus group discussions among senior leaders on areas where there are both agreements and disagreements

# What is Risk?

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## **Strategic Risk:**

**Predicted political, economic and military losses or hazards facing the United States, based on the expected likelihood and character of future events and conditions, assuming currently programmed military forces.**

Probability of adverse event or condition

X

Consequences of adverse event or condition

=

Risk (Expected Loss or Harm)\*

\* The expected loss formula does not always accurately capture a respondent's views on risk. Respondents are allowed to adjust their risk scores if they provide justification.

# 2014 Strategic Risk Assessment Process

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## Expert elicitation framework for evaluating strategic risk:

- “Challenge Area” categories, which depict different types of potential scenarios and their associated military operations
  - Derived from the 2014 Quadrennial Defense Review
- Respondent identifies scenarios or conditions in each challenge area that may generate strategic risk
- Respondent evaluates scenarios according to probability, expected consequences, and risk

# Challenge Areas

Challenge Areas	Definitions
Major Combat	<p>Operations conducted against a state or non-state actor that possesses significant military capability. This area should account for risk related to the use of WMD during the course of major combat.</p> <p><i>e.g., China, North Korea, Iran, Libya</i></p>
Irregular Warfare	<p>Stability operations, counterinsurgency, peacekeeping, or counterterrorism operations involving significant participation of U.S. forces in combat or prospective combat.</p> <p><i>e.g., Iraq, Afghanistan, Syria, Bosnia, Somalia</i></p>
Homeland Defense  (WMD & Cyber)	<p>Protection of U.S. sovereignty, territory, population, and critical infrastructure against external threats. This area should delineate among risks from WMD, cyber attack, and all other forms of external attack (except those directly related to Major Combat).</p> <p><i>e.g., 9/11, missile attack, WMD attack, cyber attack, other terrorist attack</i></p>

# Consequence Scale Aid

## Economic

## Military

## Political

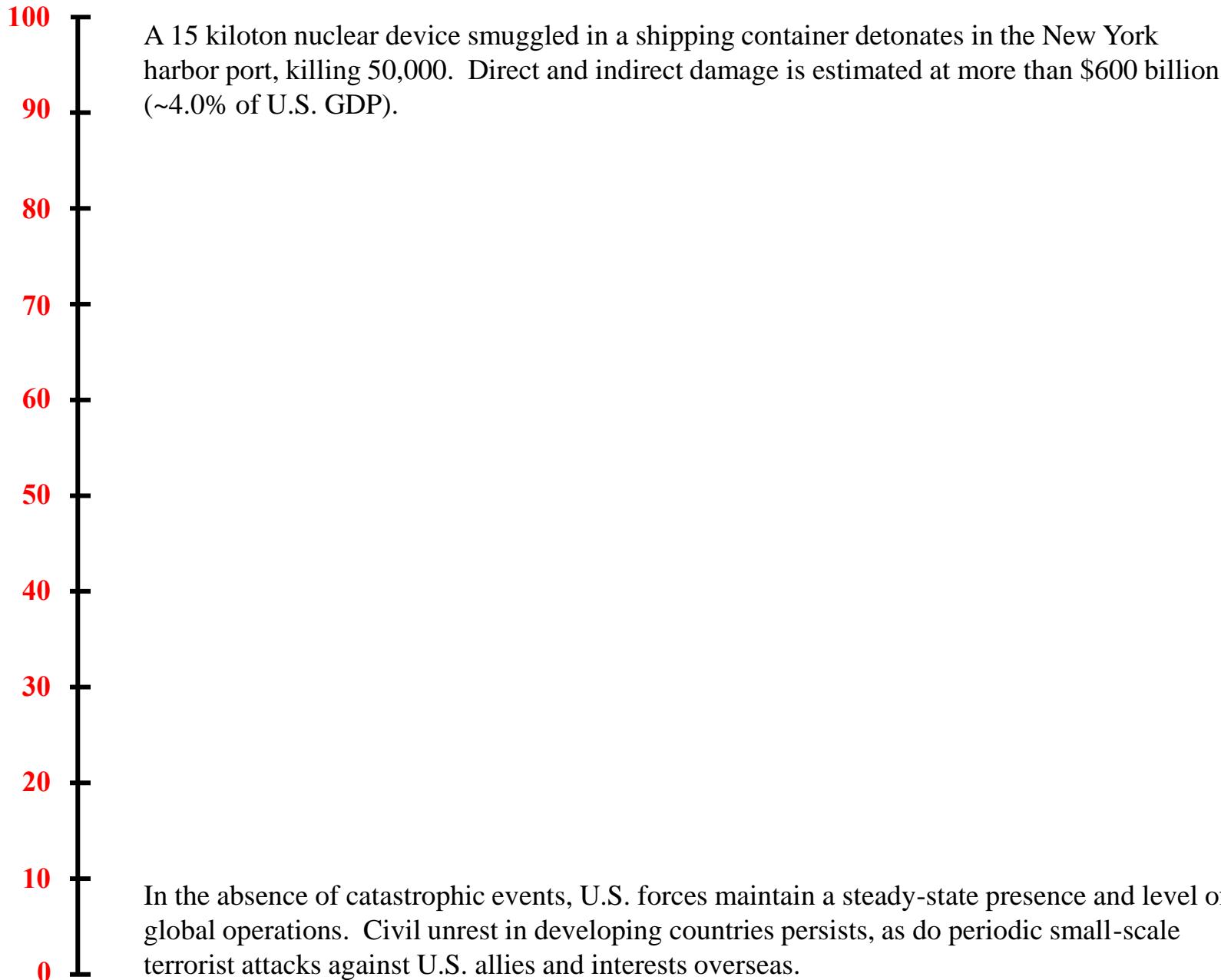
<ul style="list-style-type: none"> <li>• 4% or greater cumulative loss in GDP</li> <li>• <u>Extreme</u>, semi-permanent structural and economic costs.</li> <li>• Capital flows massively degraded and/or dollar collapses jeopardizing U.S. economic foundation.</li> <li>• Alliances and economic agreements terminated.</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of more than 10% of overall military force capability; <u>recovery longer than 4 years</u>.</li> <li>• Covering worldwide mission areas adequately is impossible.</li> <li>• Deterrence severely compromised in key areas.</li> <li>• Potential international condemnation due to high non-combatant casualties.</li> <li>• Loss of confidence in military, internally and externally.</li> </ul>	<ul style="list-style-type: none"> <li>• The U.S. seen as unreliable by multiple allies or coalition partners and new regional security orders emerge.</li> <li>• Loss of credibility as guarantor of global security.</li> <li>• Allies and friends create their own nuclear arsenals to guarantee their security</li> <li>• Competitors become increasingly aggressive and adversarial.</li> </ul>	
<ul style="list-style-type: none"> <li>• 3% cumulative loss in GDP</li> <li>• <u>Severe</u> economic costs resulting from trade disruptions, operational factors, or property damage.</li> <li>• Capital flows seriously degraded and/or substantial devaluation of dollar.</li> <li>• Global economy stalled.</li> <li>• Recovery eventually.</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of 5-10% of overall military force capability; <u>recovery within 4 yrs</u></li> <li>• Reduced worldwide mission areas commitment.</li> <li>• Deterrence weak in key areas.</li> <li>• Critical U.S. vulnerability revealed to all from military surprise.</li> <li>• International criticism due to high non-combatant casualties.</li> </ul>	<ul style="list-style-type: none"> <li>• U.S. strategic influence severely degraded.</li> <li>• U.S. loses credibility in one or more key regions of the world.</li> <li>• One or more competitors takes advantage of perceived U.S. weakness.</li> <li>• Some coalitions fail; some allies turn away from the U.S.</li> </ul>	
<ul style="list-style-type: none"> <li>• 2% cumulative loss in GDP</li> <li>• <u>Serious</u> economic costs due to trade disruptions, operational factors, or property damage.</li> <li>• Capital flows degraded and /or value of dollar weakens.</li> <li>• Economic disruptions possible, but no recession follows.</li> <li>• Reconstruction of key economic capabilities could take months.</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of 1-5% of military force capability; <u>recovery within 18 months</u>.</li> <li>• Worldwide mission areas still covered.</li> <li>• Overall mission success not questioned.</li> <li>• Deterrence weaker, but still strong.</li> <li>• High non-combatant casualties.</li> </ul>	<ul style="list-style-type: none"> <li>• U.S. weakened as major global political broker.</li> <li>• International cooperation with U.S. put at risk.</li> <li>• U.S. credibility weakened with one or more competitors.</li> <li>• U.S. partners doubt U.S. commitment and begin to forge separate security arrangements or seek unilateral measures to guarantee their security.</li> </ul>	
<ul style="list-style-type: none"> <li>• 1% cumulative loss in GDP</li> <li>• <u>Some</u> economic costs due to trade disruptions, operational factors, or property damage.</li> <li>• Confidence quickly restored domestically and internationally.</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of <u>less than 1% of military force capability</u>.</li> <li>• Worldwide mission areas covered adequately.</li> <li>• Low or predicted non-combatant casualties.</li> </ul>	<ul style="list-style-type: none"> <li>• Some political opposition to and suspicion of U.S. intentions in previously friendly countries.</li> <li>• Reduced willingness of allies and friends to cooperate with U.S. on other international security goals.</li> </ul>	
<ul style="list-style-type: none"> <li>• Negligible effect on GDP</li> </ul>	<ul style="list-style-type: none"> <li>• No major loss of military force capability overall.</li> <li>• Worldwide mission areas covered adequately.</li> <li>• Low or predicted non-combatant casualties.</li> </ul>	<ul style="list-style-type: none"> <li>• Some minor political opposition to and suspicion of U.S. intentions in previously friendly countries.</li> </ul>	

Most Severe

Least Severe

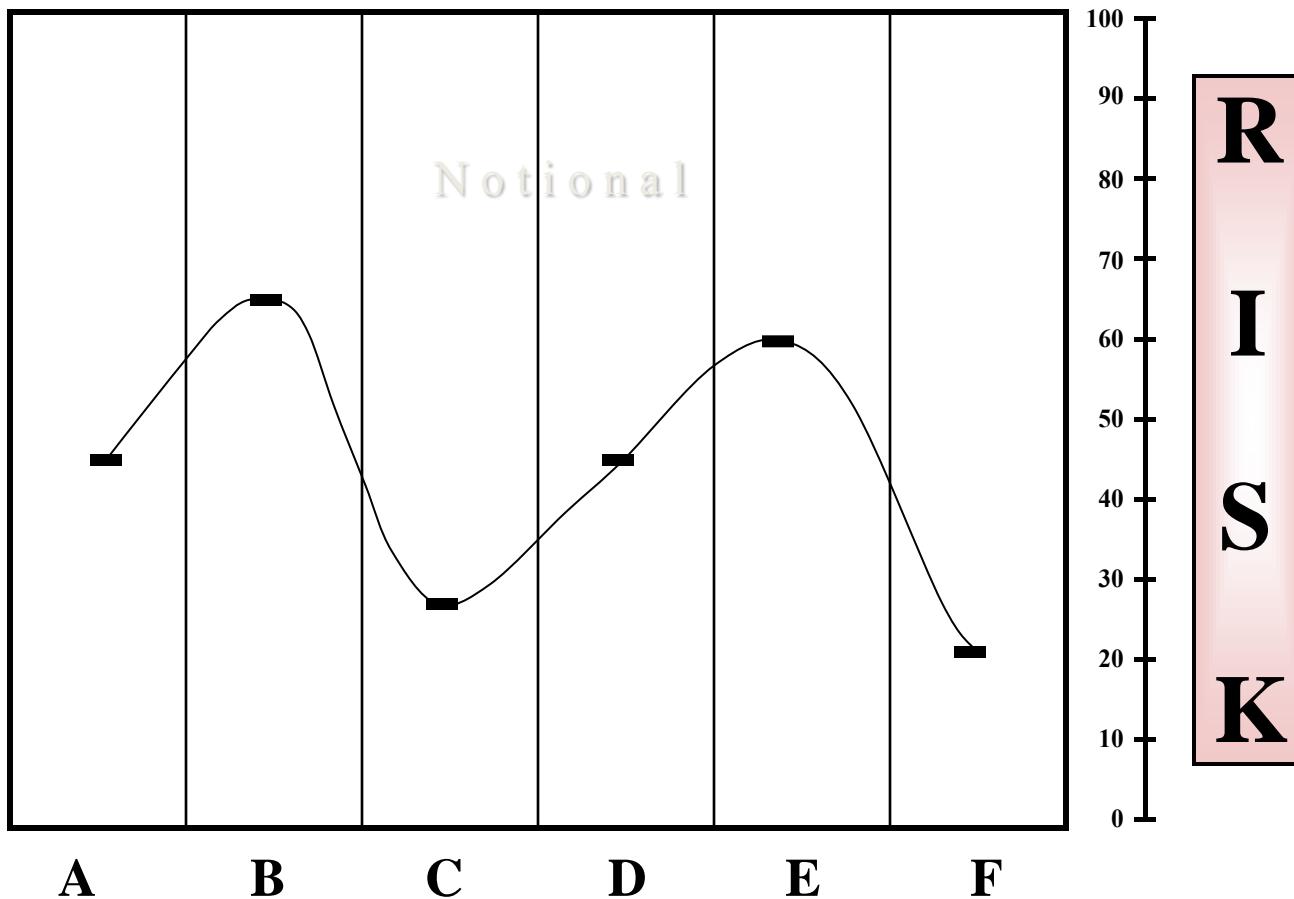
# Calibration Points for Consequence Estimates

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# Risk Profile

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# 2014 Strategic Risk Assessment Participants

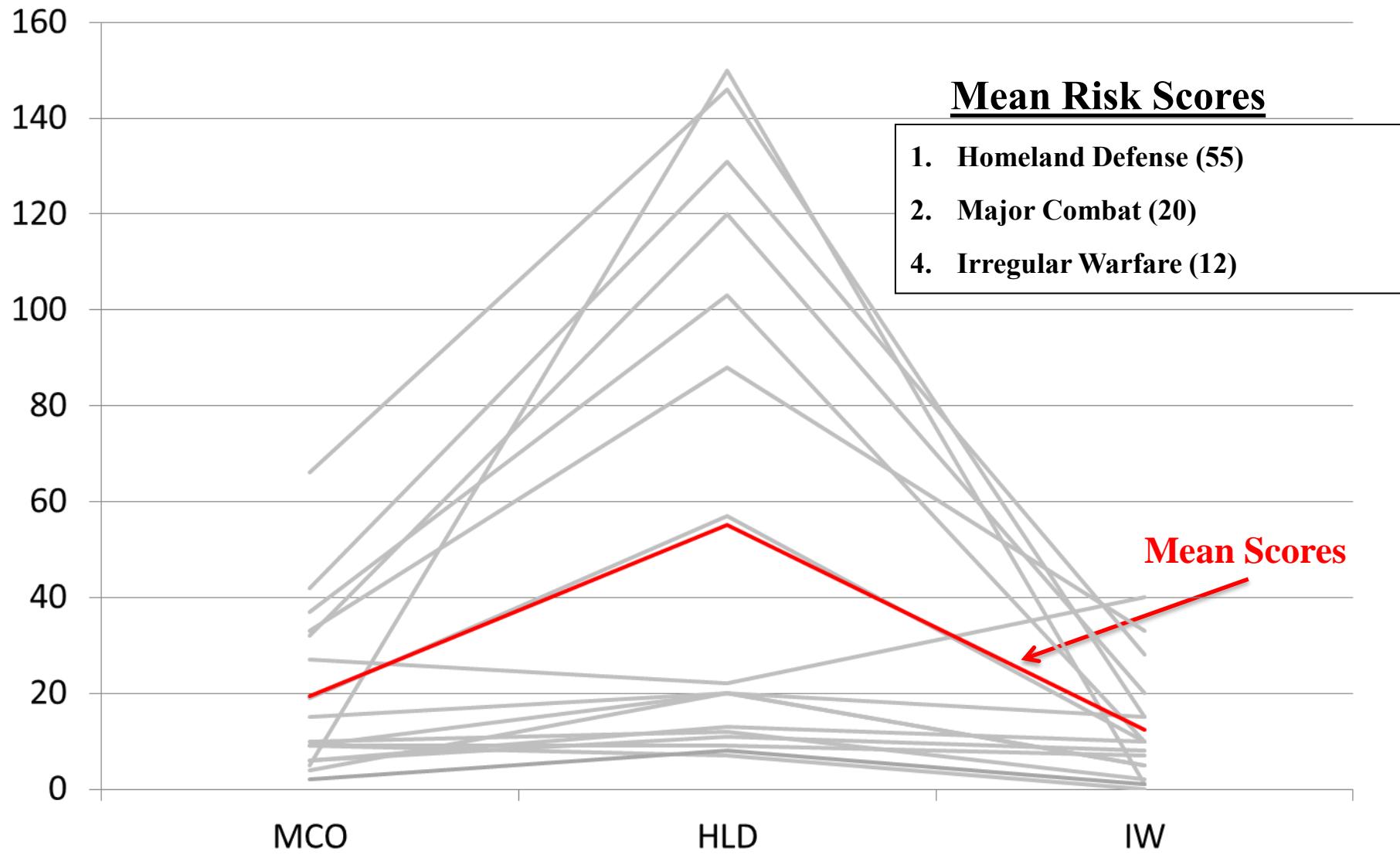
## ***90-minute interviews conducted from April - Sept 2014***

- Admiral Charles Abbot (ret)
  - Mr. Frank Carlucci
  - Dr. David Chu
  - Dr. Paul Davis
  - Mr. Michael Dominguez
  - Dr. Webster Ewell
  - Ambassador Chas Freeman
  - General Carlton Fulford (ret)
  - Dr. James Miller
  - Mr. Paul Peters
  - Ambassador Thomas Pickering
  - Governor Tom Ridge
  - Ambassador Stapleton Roy
  - General Norton Schwartz (ret)
  - Ambassador Richard Solomon
  - Mr. Peter Verga
  - General Larry Welch (ret)
  - Former Deputy Commander, U.S. European Command
  - Former Secretary of Defense
  - Former Under Secretary of Defense (P&R)
  - Senior Principal Researcher, RAND Corporation
  - Former Principal Deputy Undersecretary of Defense (P&R)
  - Director, Force Structure and Risk Assessment
  - Former Ambassador to Saudi Arabia
  - Former Deputy Commander, U.S. European Command
  - Former Under Secretary of Defense (Policy)
  - Acting Assistant Secretary of Defense (L&MR)
  - Former Under Secretary of State for Political Affairs
  - Former Secretary of Homeland Security
  - Former Assistant Secretary of State for Intelligence and Research
  - Former Chief of Staff, U.S. Air Force
  - Former Assistant Secretary of State for East Asian and Pacific Affairs
  - Senior Advisor to the Undersecretary of Defense (Policy)
  - Former Chief of Staff, U.S. Air Force

# **2014 Strategic Risk Assessment**

## **Quantitative Results**

# IRAMM Strategic Risk Profiles 2014



# Challenge Area Rankings

	Percent of Respondents Ranking This Area ...		
	1st	2nd	3rd
Homeland Defense	82%	6%	12%
Major Combat	6%	59%	18%
Irregular Warfare	6%	18%	73%

Note: Rows and columns do not add to 100% due to ties among Challenge Areas..

## Strongest majority views:

- Homeland Defense is the most risky area
  - Consists of both WMD and Cyber attacks
- Irregular Warfare is the least risky area

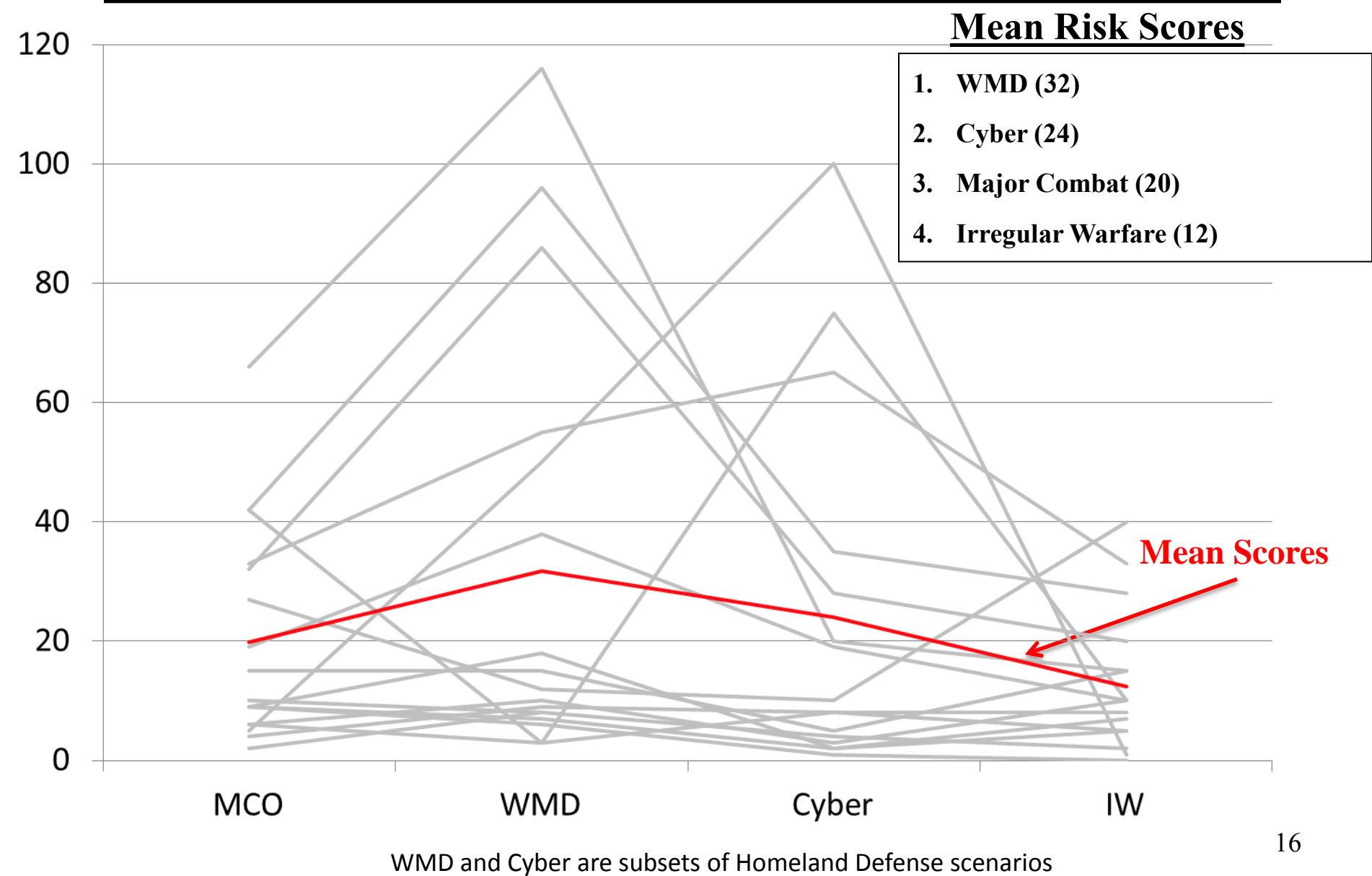
# Pairwise Comparisons

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Challenge Area Comparison	Percent Agreeing
Homeland Defense is riskier than Irregular Warfare	94%
Homeland Defense is riskier than Major Combat	82%
Major Combat is riskier than Irregular Warfare	65%

- Relatively strong majority opinions are evident for all possible pairwise comparisons between challenge areas
- The most divided opinion was on the comparison between Irregular Warfare and Major Combat

# IRAMM Strategic Risk Profiles 2014



# Challenge Area Rankings

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	Percent of Respondents Ranking This Area ...			
	1st	2nd	3rd	4th
WMD	33%	27%	7%	13%
Major Combat	20%	33%	7%	7%
Cyber	20%	7%	27%	27%
Irregular Warfare	7%	0%	13%	47%

Note: Rows and columns do not add to 100% due to ties among Challenge Areas.

No majority views:

Strongest minority view:

- Irregular Warfare is the least risky area

# **Examples of Qualitative Support for Alternative Viewpoints**

# Alternative Viewpoints

## Homeland WMD Attack

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	Greater Risk Viewpoint	Lesser Risk Viewpoint
1	<p>An individual or organization with intent to attack the U.S. with a nuclear, biological, or radiological weapon could succeed and there could be significant psychological effects. The resultant domestic <i>political consequences</i> could threaten the federal structure of our government.</p>	<p>There is a “negligible chance” that a Radiological or Chemical attack would occur and, in the event one did, the consequences would be “negligible”.</p>
2	<p>The consequences of a significant terrorist-initiated biological event had the potential to be “surprisingly” close to those of a nuclear detonation as the result of the disruption of our way of life and the suppression of the <i>economy</i> following the breakout of a vector-borne illness.</p> <p>The probability of a radiological attack is much higher than that of a nuclear attack but the consequences would be almost as severe.</p>	<p>A biological attack would most likely be conducted by a disgruntled domestic who is not particularly sophisticated. The consequences would be small and contained consisting of possibly “giving up some liberties.”</p>
3	<p>There is an 80% chance that a nuclear weapon is detonated in the U.S. in the coming decade.</p> <p>With regard to a nuclear attack, there is a serious threat e.g., emanating from Pakistan, of proliferation to small groups, and insufficient capacity to detect devices coming into the U.S.</p>	<p>Nuclear attack would require a lot of things to have to come together.</p> <p>It is too difficult for someone to detonate a nuclear device on the homeland.</p> <p>Our enemies are not sophisticated enough to obtain, create, or deliver such weapons.</p>

# Alternative Viewpoints

## Homeland Cyber Attack

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	Greater Risk Viewpoint	Lesser Risk Viewpoint
1	<p>There are very high consequences associated with cyber attacks. Imagine the complete loss of trust in credit card transactions. The electrical grid could be taken down in a whole region of the country. Cyber-attacks would affect individuals in their day-to-day life resulting in eroding confidence in government.</p>	<p>We are generally much better prepared to defend and react to cyber-attacks than we are for WMD attacks.</p>
2	<p>Cyber is a poor man's WMD and the weapon of choice of anarchists. Cyber attacks are popular because they require an easily-acquired skill set, they are relatively undetectable, unattributable, and have high destructive potential. The U.S. has created plenty of non-state enemies through its foreign policy who will be likely to launch such attacks.</p>	<p>The cyber threat is overrated. We are resilient as a nation, and we will adapt. Consequences are very unlikely to be catastrophic.</p> <p>Currently the consequences of such attacks do not reach levels that threaten our vital National interests</p>
3	<p>All major industrialized nations currently possess the capability to carry out such an attack.</p> <p>The likelihood of a substantial cyber attack is high because there are so many actors (hackers, extremists, disgruntled crazy individuals) who are attempting cyber attacks.</p>	<p>The likelihood of a cyber attack by someone sophisticated like China is muted because of the interconnected nature of today's world economy.</p> <p>Attacking the largest consumer economy in the world would likely hurt a nation like China equally as much as it would hurt us.</p>
4	<p>Cyber attacks have the potential to significantly disrupt business and financial systems as well as operational control systems of critical infrastructure systems.</p>	<p>The nightmare cyber attack that, for example, crashes the financial system is pretty unlikely, though with high economic consequences.</p>

# Alternate Viewpoints in HLD (WMD)

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- WMD High-Risk View
  - It is only a matter of time before a determined enemy successfully executes an attack with a weapon of mass destruction
    - While a nuclear attack would have physical consequences contained to a relatively small area, psychological effects would be devastating
    - A biological attack might not be constrained to a small geographical area thus resulting in widespread panic and loss of life
- WMD Low-Risk View
  - The numerous obstacles that would have to be overcome to successfully execute a nuclear attack render it virtually impossible
  - While possible to execute, biological, chemical, and radiological attacks would have consequences that are short-term, constrained to a relatively small portion of the population, and not devastating

# Alternate Viewpoints in WMD (Cyber)

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- Cyber High-Risk View
  - Cyber attacks require the least effort on the part of the attacker
    - It is relatively easy for numerous classes of actors to obtain the capability to damage U.S. vital National interests
  - Cyber attacks are potentially the most consequential
    - Taking out the financial/banking systems or power-generation/distribution systems could result in loss of confidence in U.S. government/leadership
- Cyber Low-Risk View
  - U.S. defensive capabilities are more than a match for the majority of potential attackers
  - Potential attacks by state actors with substantial capabilities are deterred by the interdependent nature of global economies
    - Attacks by nation states such as China who have the capability would hurt themselves as much more than the U.S. in such an attack

# Alternative Viewpoints

## MCO – China

	<b>Greater Risk Viewpoint</b>	<b>Lesser Risk Viewpoint</b>
1	An MCO with China is potentially really ugly triggered either by a Chinese move against Taiwan, or by some miscalculation of ours, or via a Chinese overreach. Economic consequences would be particularly severe. It could be the equivalent of World War III. If the US lost, politically we would become a second class power.	The China scenario would most likely come about as a result of disputes over islands with Japan and/or the Philippines. This would most likely not be a protracted large engagement on land but rather would involve the engagement of U.S. air forces as well as the posturing of U.S. naval forces
2	A war with China would be very consequential, though it would probably be fought over something relatively small and would involve limited objectives on both sides. The conflict might escalate to nuclear war.	An MCO with China would be no more than a South China Sea “dust up,” insignificant in its impact beyond the short term. China and the United States have too much incentive not to reach an accommodation in the prickly points of their relationship, thus mitigating against any significant or long-lasting combat operations.
3	Even though the MCO may start small over a small issue, it will be difficult to contain the conflict. China has access to sophisticated technologies, has high capabilities in the cyber arena, and has lots of resources. The logistical challenges for the U.S. will be significant as “the Pacific Ocean is a lot bigger than the Atlantic.”	Conflict would not last long or be very entangling due to the harmful effects of a substantial trade disruption involving both sides, lack of either party having a real interest in substantially damaging the other, and the consequent pressures to limit and/or de-escalate the conflict quickly.

# Alternative Viewpoints

## MCO – Iran

	<b>Greater Risk Viewpoint</b>	<b>Lesser Risk Viewpoint</b>
1	<p>Iran “remains the #1 terrorist state.”</p> <p>Conflict with Iran could likely involve Israel significantly ratcheting up the consequences.</p>	<p>The US might be “dragged into” a conflict with Iran as a result of some Israeli action. The overall consequences would be low because the US would not use land forces but rather rely on naval and air forces.</p>
2	<p>An MCO with Iran might begin over an event in Lebanon, Iraq, or Syria resulting in the mining of the Straits of Hormuz. The Iranians would respond to U.S. attacks in an asymmetric fashion using IW tactics at times and places of their choosing to include possible WMD attacks on the U.S. homeland. The reduced size of the U.S. Army could not cover all potential scenarios.</p>	<p>Iran has no interest in becoming involved in a conflict right now because they are currently achieving their political goals. The US may lack the economic resources to support a conflict as a result of a declining US economy and/or the impact of sequestration.</p>
3	<p>Conflict with Iran would be extremely difficult to contain because of Sunni/Shia tensions in the region. The scenario would likely involve other Gulf States. Because of Iran’s oil reserves, the economic consequences would be high. There is a 60% chance that the conflict goes nuclear.</p>	<p>The likelihood of conflict with Iran is diminished by a lack of US political will to engage, except in the case of responding to some “cataclysmic event” (e.g. an Iranian missile attack on Israel).</p>

# Alternate Viewpoints in MCO

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- MCO – High-Risk View
  - Though an MCO might start over a relatively minor incident or even a diplomatic miscalculation/mistake it will be hard to contain the war once it begins
    - War in the Middle East is very hard to keep contained due to ethnic/religious tensions, the potential number of potential actors in close proximity, and the potential for asymmetric attacks
    - War in the Far East would be hard to contain due to U.S. obligations to allies, unpredictable actions by actors like DPRK, and significant conventional and cyber capabilities of China
- MCO – Low-Risk View
  - Lack of U.S. political will to engage in a lengthy war will likely keep war from happening
  - In the unlikely event that the U.S. does find itself fighting an MCO, political/budgetary pressures and a significantly smaller Army will result in only air/naval skirmishes that do not involve significant ground combat

# Alternative Viewpoints

## Irregular Warfare

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	<b>Greater Risk Viewpoint</b>	<b>Lesser Risk Viewpoint</b>
1	<p>There is a blurred line between IW and MCOs. MCO scenarios have significant IW components. The Middle East, e.g., is a region of continuous turmoil fed by terrorist actions that might erupt at any time into an MCO. The continuous IW in the region is particularly risky because the US is war-weary and the military is operating in a severely resource-constrained environment. The lack of an endgame in IW operations in the ME increases risk.</p>	<p>There is a distinction between level of concern and risk. Even though, the current risk from IW was low relative to the other CAs, it is important to keep risk low by “staying strong”. Mil-to-mil relations, intelligence coverage, and technological advances are examples of areas where the US should invest in order to keep risk from rising.</p>
2	<p>We are nearly certain to become involved in another stability operations scenario as we currently are in Afghanistan.</p>	<p>Although the consequences of IW scenarios are relatively low, risk would increase significantly if we were not sufficiently prepared to handle these scenarios; therefore we need to invest in a force structure to deal with this.</p>
3	<p>Non-state actors are gaining capabilities over time, thereby increasing both the probability of a vital national interest-threatening event and the consequences of that event.</p>	<p>Large scale operations in IW are extremely unlikely.</p>

# Alternative Viewpoints

## Irregular Warfare (Contd.)

	Greater Risk Viewpoint	Lesser Risk Viewpoint
4	<p>Allowing terrorists free reign in the parts of Iraq and Syria currently controlled by ISIS would result in connective tissue between disparate terrorist groups forming in ways that will result in an attack on the U.S. homeland. Such an attack would likely precipitate U.S. involvement in an MCO. The risk in IW comes from failing to engage in effective counter-terrorism operations which lead to higher risk in other CAs.</p>	<p>There is zero chance that we would choose to get into an IW scenario in the next ten years.</p>
5	<p>IW is the bread and butter of U.S. forces for the next 10 years. The U.S. will conduct more and more of these types of missions.</p>	<p>Though it is 100% certain that the U.S. will be engaged in IW over the next ten years, it poses no risk to vital National interests.</p>
6	<p>It is important that we are prepared to act in situations similar to Afghanistan and Iraq. It is critical to reassure our allies that we will do what we have pledged. Many countries around the world assume that we will act if called upon. It is important to remember that we have made a real difference in Afghanistan and in Iraq.</p>	<p>Having been chastened by the failure of regime change and nation building endeavors in Iraq and Afghanistan, the U.S. will be unlikely to undertake tasks of such magnitude over the next decade.</p>

# Insights from IW Viewpoints

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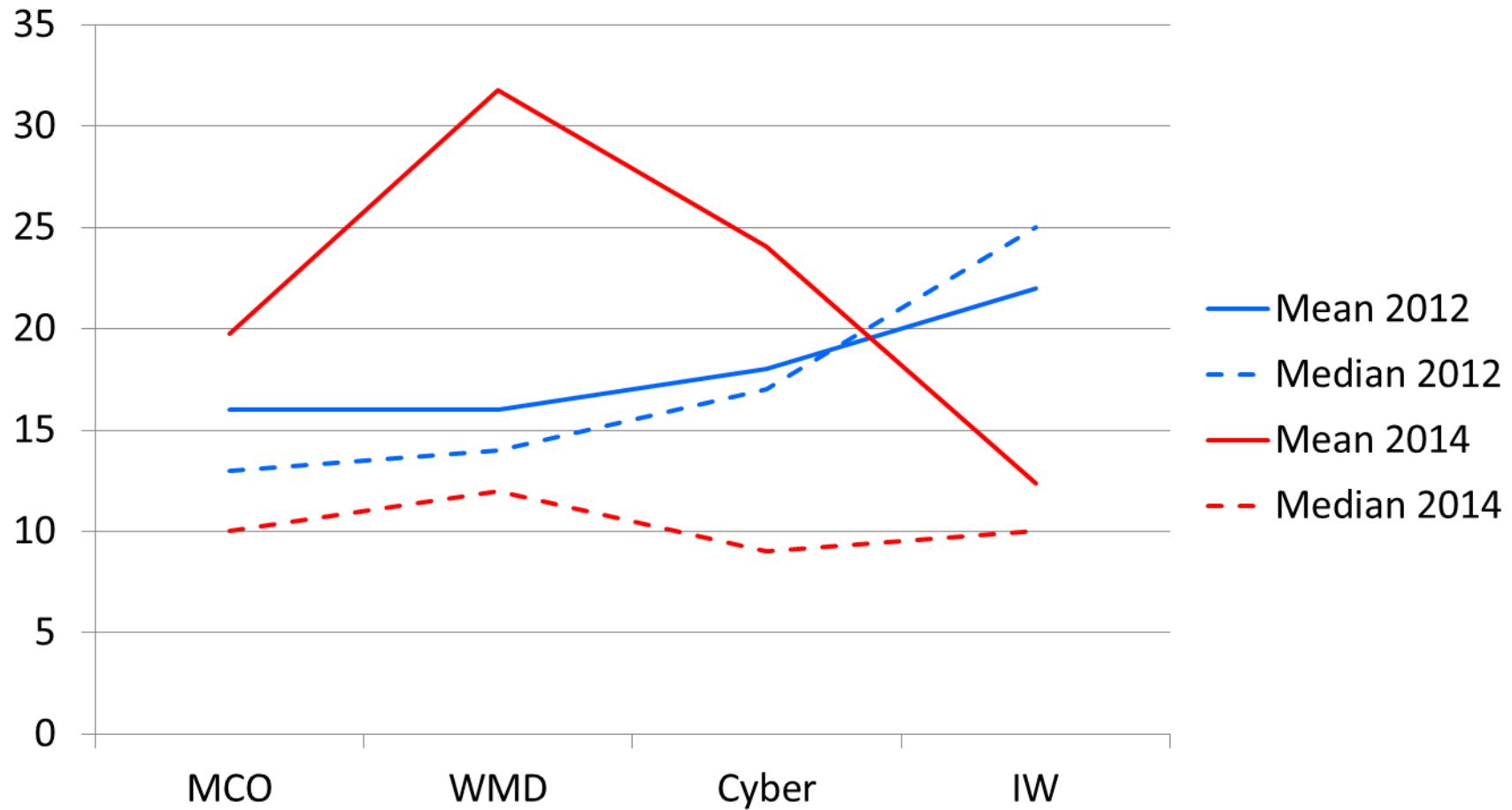
- Even though most respondents scored IW as low-risk (in terms of probability/consequences) relative to the other Challenge Areas, the U.S. should remain vigilant in this arena
- Engaging in counter-terrorism operations and stability operations can actually decrease risk in other Challenge Areas
- In some ways, this Challenge Area was viewed differently than others
  - Viewed as though the U.S. has more “choice” in whether or not to be involved in these types of scenarios
  - Viewed as a way to mitigate risk
  - Viewed as a “catch all” category that is somewhat ill-defined

# **Additional Insights**

## **Comparing Results from 2012 and 2014**

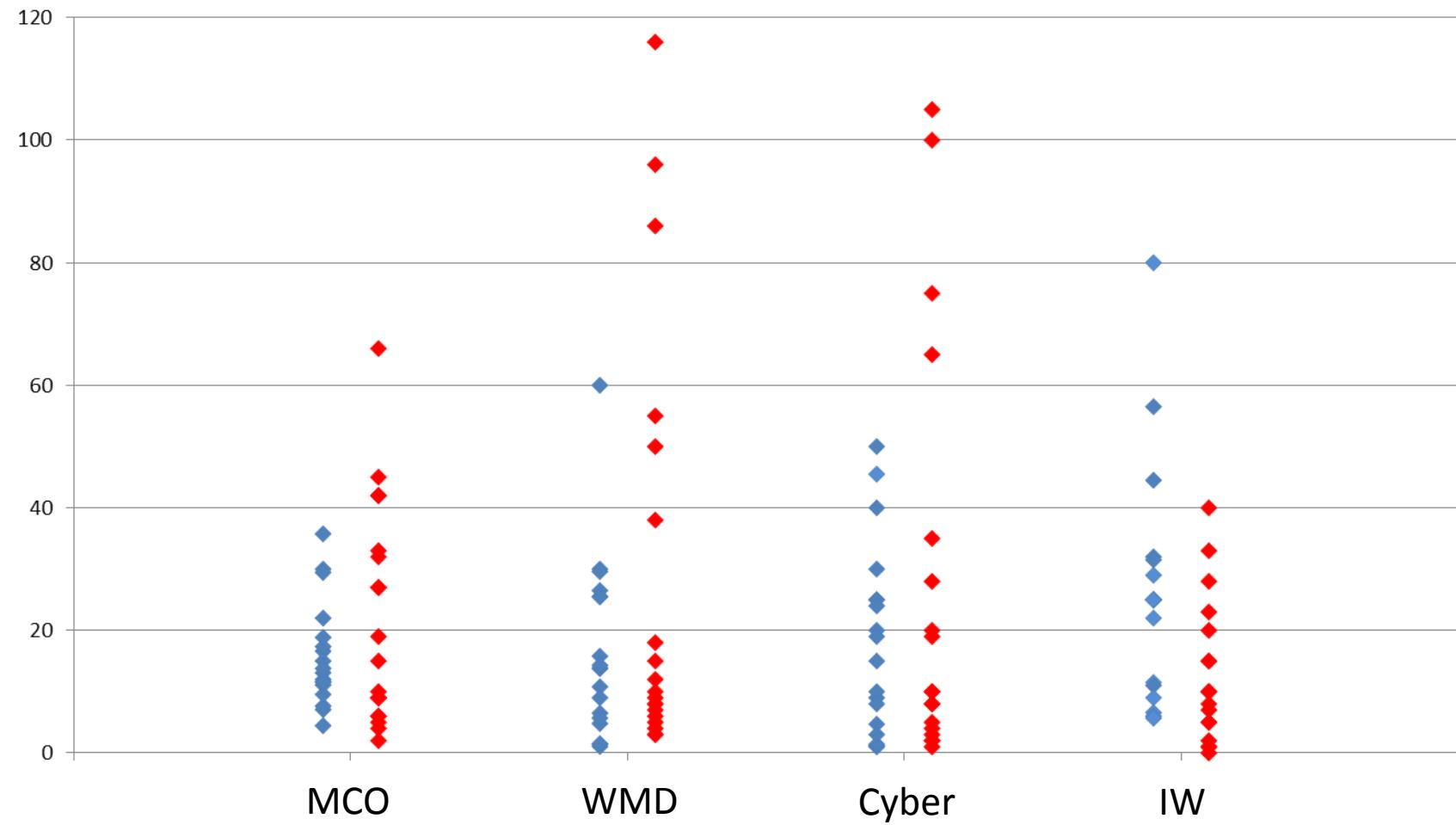
# Risk Scores by Challenge Area

2012 vs 2014

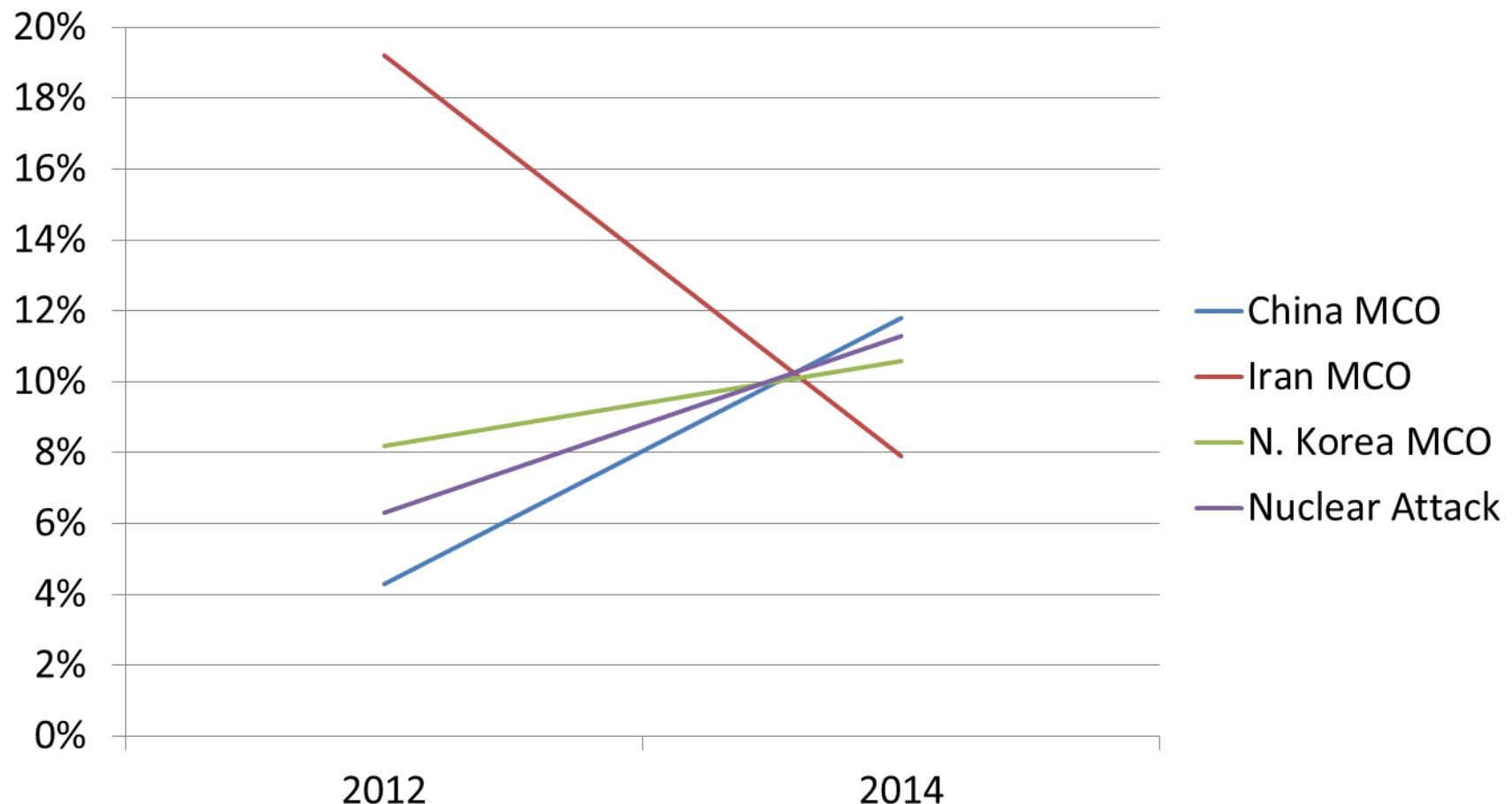


# Risk by Challenge Area

2012 vs. 2014

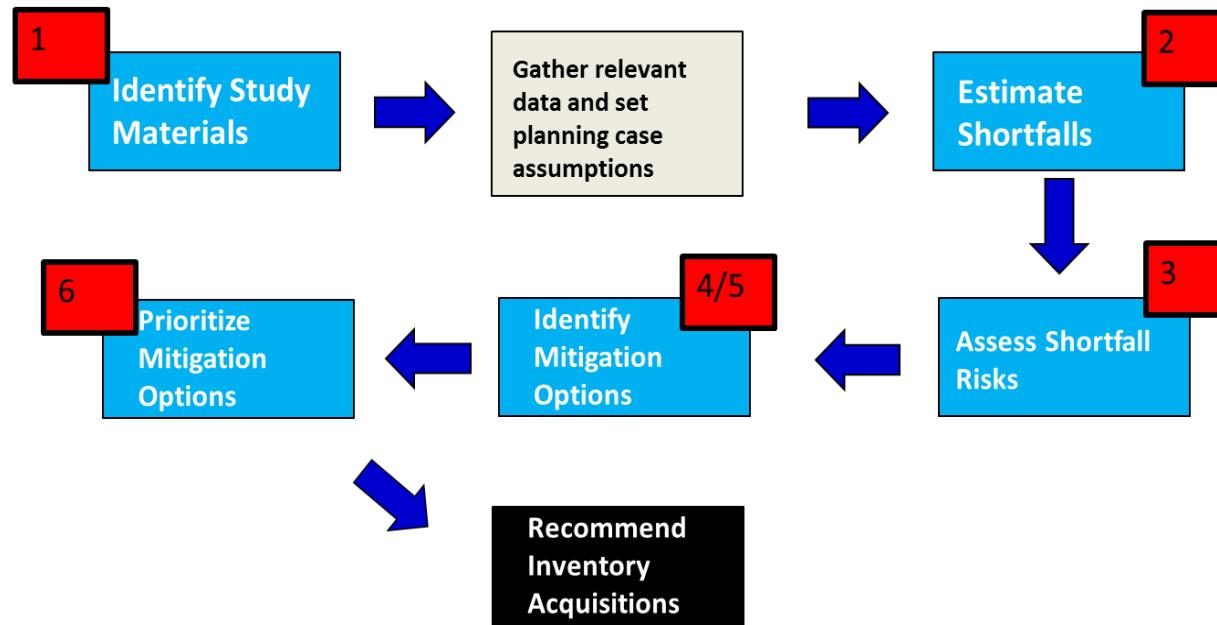


# Average Probability (Selected Scenarios) 2012 vs. 2014



# **Applications of IRAMM**

# Risk Assessment and Mitigation Framework for Strategic Materials (RAMF-SM)



- IRAMM is used in step 3, Assess Shortfall Risks
  - Probability estimates for scenarios that cause strategic material shortfalls
  - Strategic context for materials experts who estimate risk due to strategic material shortfalls

# IRAMM Inputs to RAMF-SM

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1. Probability estimates for scenarios that cause strategic material shortfalls
2. Strategic context for materials experts who estimate risk due to strategic material shortfalls

# Potential Exercise Applications

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1. Support to senior DoD decision-making on policy guidance and portfolio management
  - Setting strategic context for strategic materials requirements
  - Input to strategic planning (QDR / DPG / GEF)
  - Evaluation of portfolio alternatives (PPBE)
2. Development of interagency risk assessment and management
  - Add interagency (e.g. State, DHS, DNI, etc.) perspective to DoD risk assessment
  - Tailor risk assessment for NSC use at the national level
3. Education and Training
  - Capstone course for GO/FO
  - Apex course for SES
  - Other venues (NDU, service academies, etc.)
4. Documentation and reporting of decision-making
  - Budget/FYDP rationale
  - Risk assessment to Congress (for QDR and Chairman's annual assessment)
  - Framework for DoD-Congressional interactions on strategy and resource trade-off decisions